Third United Nations International Conference on the Peaceful Uses of Atomic Energy

A/CONF.28/A/321
USSR
February 1964
Original: RUSSIAN

Confidential until official release during Conference

Abstract

CONSTRUCTION OF POWERFUL LOOP-TYPE REACTORS
THE МИР RESEARCH LOOP-TYPE REACTOR

Yu.M.Bulkin, A.P.Bovin,
Yu.G.Nikolaev et al.

The paper consists of two sections.

The first section compares modern loop-type reactors and deals with the main engineering and physical problems of their consturction and operation.

Four types of powerful loop-type reactors are compared:

a) vessel-type reactors;

b) vessel-type swimming-pool reactors;

c) channel-type reactors;

d) channel-type swimming-pool reactors.

In the second section, the Мир research loop-type reactor, now being constructed in the Soviet Union, is described; it will be a channel-type swimming-pool reactor.

The following problems characteristic of loop-type reactors are dealt with in the paper:

a) correspondence of conditions for testing fuel elements in a loop-type reactor to the natural working conditions of the-

Translation provided by courtesy of the submitting Government

se elements;

b) maintenance of the prescribed conditions for testing fuel elements simultaneously in several loop channels;

c) increase in the duration of loop-type reactor working cycles ;

d) rapid re-starting of a loop-type reactor after a spurious trip;

e) reduction of the thermal neutron flux depressions where the loop channels are installed;

f) choosing types of loop channels and the place for them in the reactor;

g) safety of channel tests;

h) preparatory work preceding fuel element tests in a loop-type reactor.

The maximum power of the Мир -type reactor, referred to in the paper, is 100 megawatts. To maintain the prescribed conditions for testing fuel elements in the loop channels of the reactor its power can in the course of operation be changed. Highly enriched uranium is to be used as fuel; the maximal thermal neutron flux--5×10^{14} n/cm^{2}sec.

The fuel assemblies of the reactor, consisting of concentrically arranged tubular fuel elements with separating lengthwise fins, are located in the channels with ordinary pressure water cooling.

Water is fed to the channels from top, through a system of collectors; each collector distributes it between several chan-

nels. Water removal is effected below, from each channel separately.

Within the limits of the core, the height of which is 1 m, the channels run through the beryllium blocks having the shape of a hexahedral prism. The interval between the channels is 150 mm.

Beryllium blocks are also used in the first layer of the side reflector; the second layer of the reflector consists of aluminium-coated graphiteb blocks.

Sixteen uniflow loop channels of a V-shaped design, up to 150 mm. in diameter, can be installed in the core and the reflector.

The core and the working and loop channels of the reactor, as well as the collectors and tubular branches are completely sumbmerged into a pool.

The beryllium and graphite blocks are cooled with water from the pool, which circulates through a separate circuit.